

REMARKS

The final Office action dated May 20, 2003 is acknowledged. Claims 1-11 are pending in the instant application. Applicant wishes to thank the Examiner for his withdrawal of the rejection of claims 1-11 under Section 112, first paragraph and claim 2 under Section 112, second paragraph. However, according to the present final Office action, claims 1-11 are still rejected on other grounds as set forth in the previous Office action. By the present "Reply to Final Office Action," Applicant has not amended the claims but rather is presenting a number of reasons distinguishing the invention as defined in the claims from Sherman et al. Reconsideration of the claims is respectfully requested.

Applicant is submitting formal drawings herewith (and annotated drawings) that include the proposed amendments thereto which were submitted in the response to the previous Office action. Applicant wishes to thank the Examiner for his withdrawal of the objection to the drawings based on the Applicant's proposed amendments.

Rejection of Claims 1-11 under 35 U.S.C. 102(e) or 103 (a)

Claims 1-11 have been rejected under 35 U.S.C. 102(e) as being anticipated by, or in the alternative under 103(a) as being obvious over, U.S. Patent No. 6,407,195 B2 (Sherman et al.). It is respectfully submitted that claims 1-11 are patentably distinct from this prior art reference.

The Examiner states that, regarding claims 1, 4, 7 and 8, Sherman et al. discloses a process for the production of polysiloxane pressure-sensitive adhesive (PSA) layers by means of coating and drying a one-component polysiloxane PSA solution onto a suitable flat-shaped

carrier (col. 19, line 49 – col. 20, line 30), a complex of a metal ion of the group as instantly claimed, with a low-molecular organic complex former, i.e., titanium acetylacetone, added to the organic adhesive solution to be coated (col. 14, lines 35-47) and heating and or drying of the adhesive (col. 23, lines 14-18). The Examiner also states that Sherman et al. appears to inherently disclose where the metal ion is only released from the bond to the complex former under the conditions of heating and or drying, and the organic complex former is substantially removed during drying. It is the Examiner's assertion that because the process of the Applicant is the same as that of Sherman et al., it is inherently disclosed that the same reaction would have occurred. The Examiner offers in the alternative that if not inherent, then it would have been obvious to one of ordinary skill in the art at the time the invention was made, for the metal ion to be released from the bond to the complex former under the conditions of heating and or drying because the process and materials of Sherman et al. are at least similar to those of the Applicant, and at least similar materials in the same process would have been expected to yield at least similar results.

Regarding claims 2 and 3, the Examiner states that Sherman et al. teaches an amount of additive of up to about 10 percent by weight (col. 13, lines 41-46), which encompasses the instantly claimed range.

Regarding claim 5, the Examiner states Sherman et al. teaches the drying step being carried out at a temperature of between 20 and 120°C (col. 23, lines 14-18).

With respect to claim 6, the Examiner states that Sherman et al. teaches the same materials and the same process as Applicant, as set forth above. The Examiner further states that Sherman et al. discloses an adhesive thickness of 38 μ m at col. 23, lines 14-18, which,

when coated with the same materials as Applicant, would yield a weight per unit area that is inherently included in the instantly claimed range of between 10 and 300 g m².

Lastly, regarding claims 9-11, the Examiner states that Sherman et al. teaches the polysiloxane being substantially polydimethyl siloxane (col. 21, line 17 – col. 22, line 67), a free silanol and a medicinal patch having a layered structure, the structure having at least one layer of polysiloxane PSA produced by the means of claim 1 (col. 19, lines 49-60), respectively.

Applicant respectfully submits that the present claims are patentably distinguishable from Sherman et al. Specifically, each of the features of the claims of the present invention, namely claim 1, are not provided, taught or disclosed in the prior art reference, nor would they be obvious therefrom, as will be demonstrated in greater detail below.

As the Examiner is well aware, the present invention concerns methods for producing polysiloxane-based pressure-sensitive adhesives which have improved physical properties, i.e., improved suppression of “cold flow.” In the production methods of the present invention, one-component polymer solutions known in the prior art are used as a starting material (rather than two or more component polymer solutions). These one-component prior art polysiloxane-based polymers are described in the present specification at page 3, paragraphs 2 – 7, as having the following characteristics: (1) they do not exhibit three-dimensional cross-linking (or only in microscopic dimensions), (2) they have a structure which is substantially linear not branched, (3) they are not intended for a two-component reaction in the course of their further processing (e.g., a two-component reaction in the sense of resin and hardener which yields a three-dimensional polymer network), and (4) they are

one-component polymer solutions. The process for the production of polysiloxane PSA layers, as provided in claim 1, requires that a metal ion complex is added to the organic adhesive solution before the steps of coating and drying take place. The PSA layers obtained by this method have unique properties, in particular, the cold flow phenomenon is reduced due to the addition of the metal ion.

Sherman et al. discloses a process for the production of polysiloxane pressure-sensitive adhesive (PSA) layers by means of the coating of a PSA solution and a subsequent drying step. In this process, alkyl titanates, such as titanium acetyl acetonate, may be used as curing catalysts for moisture-curable adhesive polymers. Sherman et al. specifically teaches that alkyl titanates are used as moisture curing catalysts (column 13, lines 34-46).

In other words, these substances catalyze a moisture curing reaction which is carried out at room temperature at 50% relative humidity (col. 40, lines 5-6 and lines 26-27). This curing reaction follows the coating drying steps and requires typically one week (Examples 30 and 31, col. 39-40). The catalyst is not consumed or converted during this reaction, but rather is recovered unchanged after the reaction is completed. Accordingly, applicant submits that moisture curing is only possible if the polysiloxane molecules in the PSA solution have been modified by endcapping agents which create end groups which are reactive under moisture curing conditions. Such moisture-curable end groups are described in Sherman et al. at column 11, lines 44-59.

Sherman et al. also teaches, at column 14, lines 35-47, that alkyl titanates are described as "suitable curing catalysts for moisture curable polydiorganosiloxane oligourethane segmented copolymers." Applicant respectfully submits that from this teaching it would be

clear to one skilled in the art that Sherman et al. considers the use of these catalysts only in such cases where the polysiloxane PSA polymer carries moisture-curable end groups. Conversely, if a polysiloxane polymer is used which is not moisture-curable, then, according to the teachings of Sherman et al., the addition of a moisture curing catalyst, such as titanium acetyl acetonate, would be highly nonsensical. Applicant respectfully points out that the polysiloxane polymers used in the present invention are not moisture-curable.

Applicant also wishes to point out that Sherman et al. teaches the use of radiation curing, UV curing and thermal curing. In these cases, curing may be promoted by adding photoinitiators or peroxides (col. 14, lines 3-34), but not alkyl titanates which would only catalyze moisture curing. As for suitable cross-linking agents, Sherman et al. teaches certain silane cross-linking agents, which are disclosed in col. 13, lines 47-60. This group does not include alkyl titanates; therefore one skilled in the art would conclude that Sherman et al. clearly does not consider alkyl titanates to be appropriate cross-linking agents.

Applicant now wishes to point out the specific main differences between the present invention and that of Sherman et al. For example, and most importantly, Sherman et al. describes the use of titanium acetyl acetonate as a catalyst which catalyzes a cross-linking reaction but which does not act as a cross-linking substance itself. Generally, a catalyst is not consumed in the course of the reaction which it catalyzes, but it is recovered in its original state after the reaction is completed. In contrast, in the process of the present invention titanium acetyl acetonate directly participates in the cross-linking reaction as titanyl ions are incorporated into the polymer network (after being released from the complex former, which is evaporated during the drying step). Cross-linking of the polysiloxane

molecules is caused by evaporating the acetyl acetone complex former during the drying step, after which the titanyl ion is capable of cross-linking the polysiloxane molecules. Applicant submits that the chemical reaction which defines this cross-linking reaction may be described as follows: $\text{TiO}_2 + 2 \text{HO-Si-R} \rightarrow \text{R-Si-O-TiO-O-Si-R}$ (complex former acetyl acetonate is released evaporated). From this, applicant submits that it should be clear to one skilled in the art that titanium acetyl acetonate is a true reaction partner in the process of the present invention, rather than merely acting as a catalyst (as in the process described by Sherman et al.). Sherman et al. does not teach or describe a cross-linking reaction in which the silicone adhesive molecules are cross-linked by the metal ion, as specified in claim 1.

Other significant differences between the process of the present invention and that of Sherman et al. which the applicant wishes to point out are as follows:

- In the process described by Sherman et al., alkyl titanates such as titanium acetyl acetonate are used to catalyze a curing reaction which requires the presence of certain chemical groups (i.e., moisture curable groups in the polysiloxane polymers). The polymers of the present invention are not described as having such moisture curable end groups.
- In the process defined in the present claims, substances such as titanium acetyl acetonate are added to cause a cross-linking reaction which is fundamentally different from the moisture curing reaction described by Sherman et al. Specifically, the silicone PSA's of the present invention are moisture-resistant and do not undergo either a chemical or a physical change when exposed to moisture.

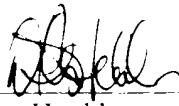
- In the process of Sherman et al., moisture curing (for example, catalyzed by titanium acetyl acetonate) is performed after the coating drying steps as an additional treatment. To the contrary, the pressure sensitive adhesive of the present invention is cross-linked by the metal ion during the steps of coating and drying (claim 1, as amended).
- In the presently claimed process, cross-linking is achieved by adding titanium acetyl acetonate (or a related cross-linker) to the PSA solution and by coating/drying the solution. No additional step of moisture curing, as taught by Sherman et al., is required or even desirable. As is evident from the examples provided throughout the present specification, the adhesive coatings were directly subjected to the various mechanical testing procedures after the drying step. The improvement of the suppression of the rheological properties (i.e., reduced "cold flow") was due to the presence of the cross-linker during the coating/drying step. No additional moisture curing step (or any other curing step) was required to improve the suppression of the aforementioned properties.
- Sherman et al. does not mention the possibility that titanium acetyl acetonate might be useful as a cross-linking agent. Applicant respectfully points out that the cross-linking agents mentioned by Sherman et al., as noted above, belong to a completely different group of chemical substances. Sherman et al. did not teach or suggest the addition of substances such as titanium acetyl acetonate in cases where moisture curing is not carried out.

Accordingly, for the differences and reasons noted above, the Applicant believes that the present invention is not anticipated by the Sherman et al. reference as each and every feature of the present invention is not taught or disclosed therein, nor would it be obvious to one skilled in the art based on that reference. Accordingly, withdrawal of this rejection is respectfully requested.

Conclusion

For the foregoing reasons, it is respectfully submitted the present application is in condition for allowance, and such action is earnestly solicited. The Examiner is invited to call the undersigned if there are any remaining issues to be discussed which could expedite the prosecution of the present application.

Respectfully submitted,

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DPH sm
Enc. Formal drawings

Cross-linker titanyl acetyl acetonate

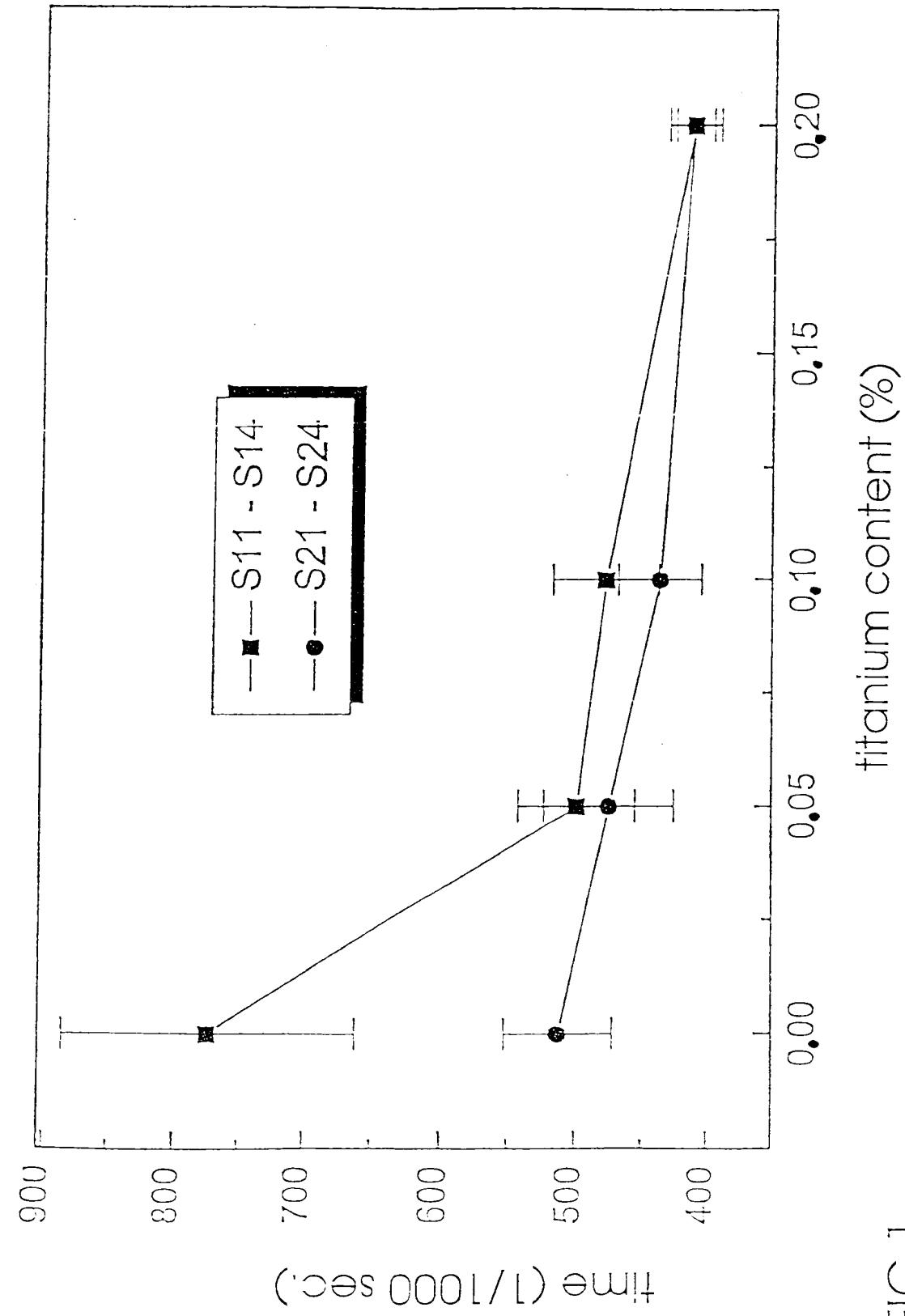


FIG. 1

Cross-linker aluminum acetyl acetonate

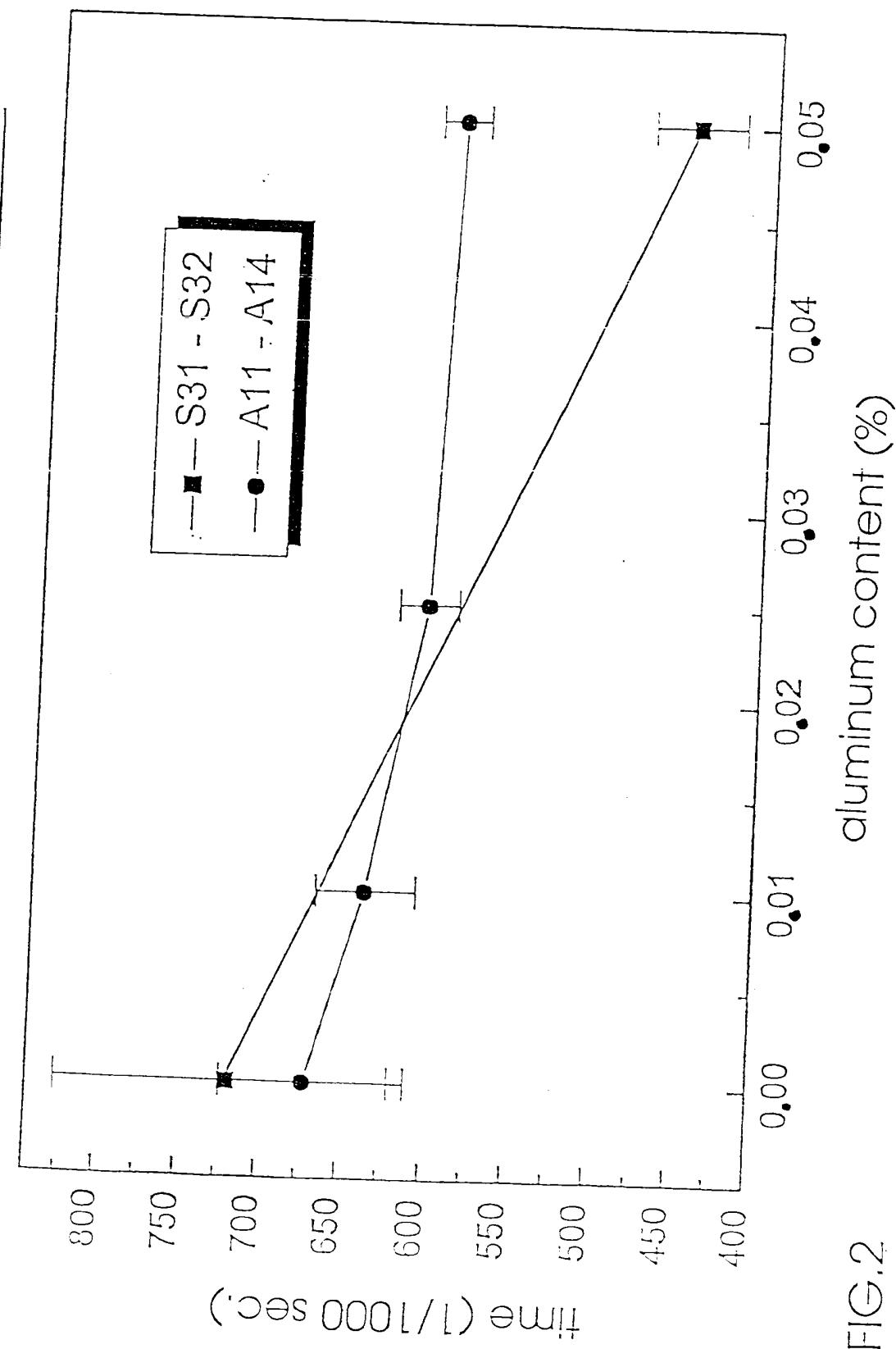
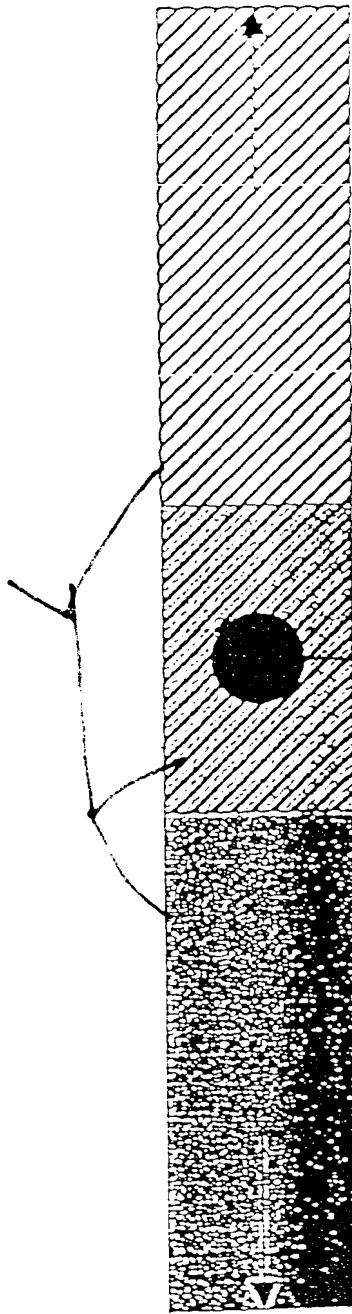
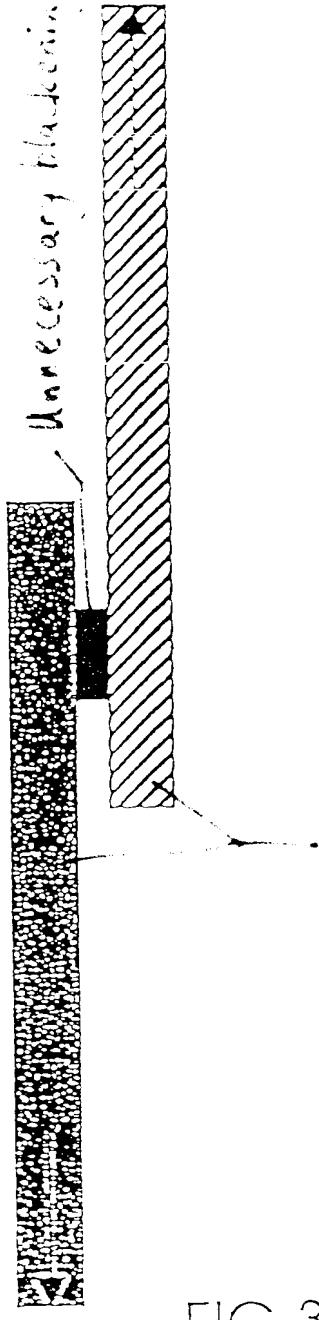


FIG.2

Unnecessary stippling removed.



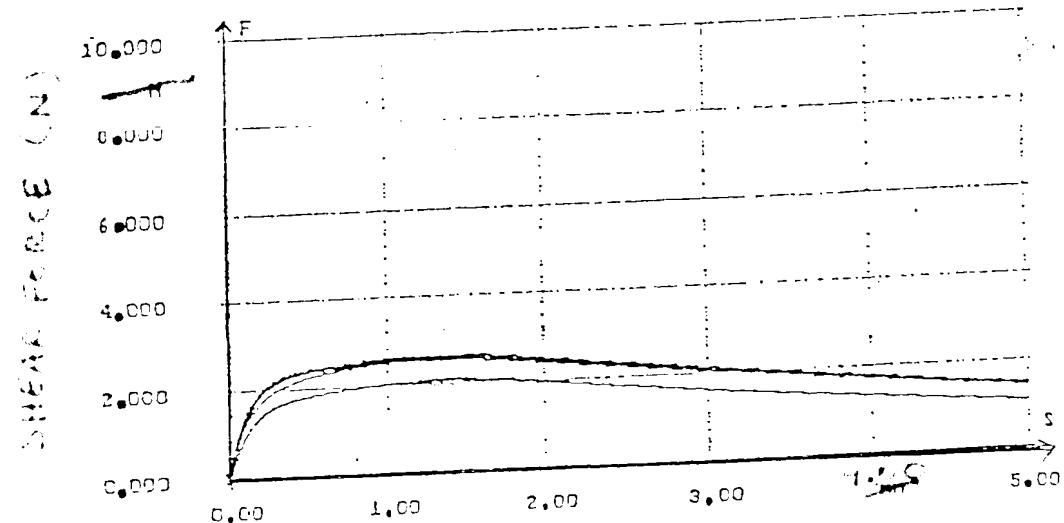
Unnecessary blackening removed.



Unnecessary Stippling Removed

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MATERIALS

FIG.4

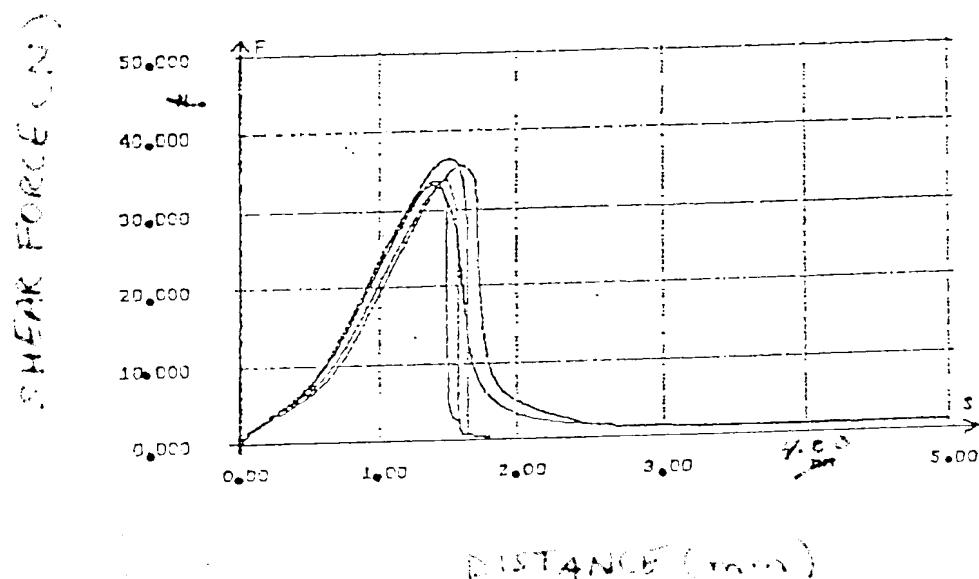


FIG.5

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Plastic limit load

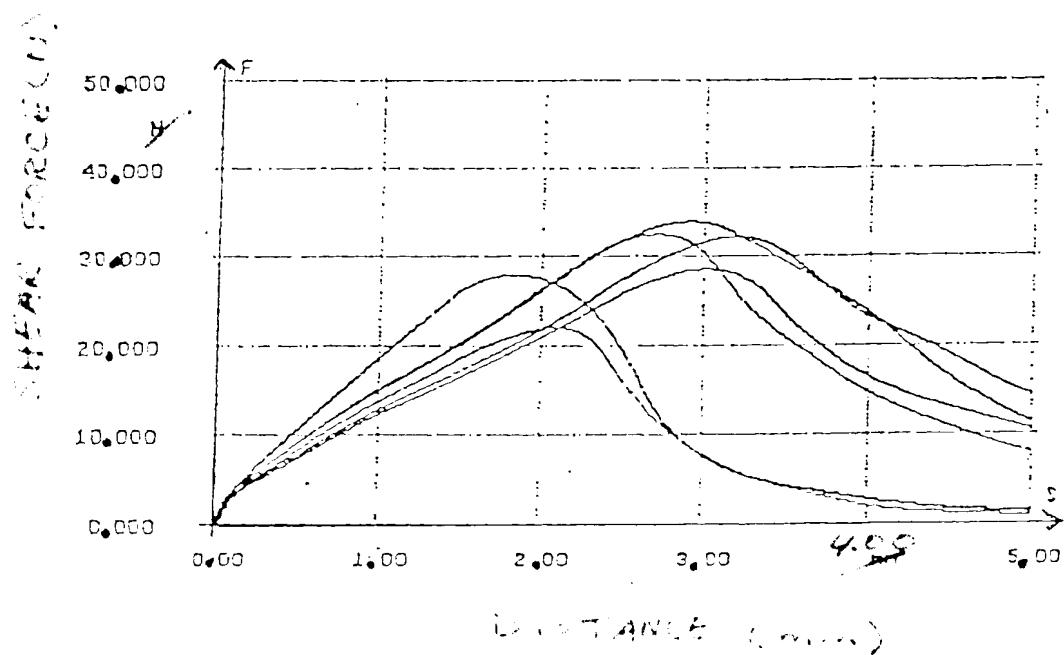


FIG.6

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Amplitude (mm)

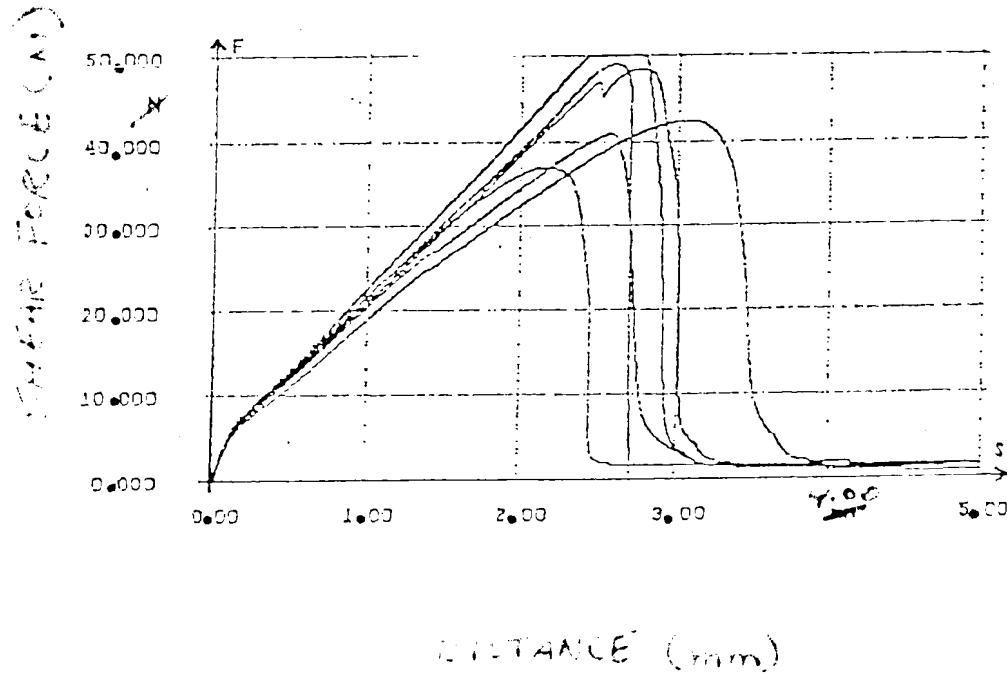


FIG.7